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Artificial Intelligence in Sustainability Reporting: Mapping a Nascent Field through Bibliometric Analysis

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Abstract

Purpose – This study aims to examine and provide empirical evidence regarding the influence of corporate political connections and family ownership on audit quality with return on assets, leverage, and public accounting firm size as control variables.

Design/methodology/approach – This study uses a quantitative approach. The population in this study includes SOEs and conglomerate companies listed on the Indonesia Stock Exchange in 2021-2023. Samples were taken using a purposive sampling method. The analysis method used is multiple linear regression analysis.

Findings – The results of this study found that corporate political connections and family ownership have no significant effect on audit quality. Audit quality is influenced by the control variable, public accounting firm size.

Originality/value – This study contributes to the audit quality literature in several ways. First, research that explores the variables of political connections and family ownership in the context of audit quality is still limited. Second, previous studies regarding the influence of political connections and family ownership on audit quality in Indonesia used input-based measurements, such as auditor choice as a proxy for audit quality. In this study, the audit quality measurement used is output-based, which is based on financial reporting quality measured using earnings quality (discretionary accruals) which is more relevant to be applied in Indonesia, considering that Indonesia is a country with a high level of opacity of corporate earnings. Third, previous studies use dummy variables to indicate whether a company has political connections, so the variation in the strength of connections is less revealed. In this study, political connections are measured using an index score of political connections with various levels of positions in the bureaucracy.

Research limitations/implications – This research was only conducted on SOEs and conglomerate companies listed on the IDX; therefore, the research results cannot be generalized to other sectors/types of companies. The period in this study is still relatively short, which is only limited to a span of 3 years from 2021-2023. Future research can expand the research sample size, including all companies listed on the IDX, and extend the observation period to obtain more comprehensive results.

Keywords: Corporate political connections, family ownership, audit quality

Article Type: Research Paper



Introduction

According to [Leitoniene & Kundeliene \(2021\)](#) sustainability reporting is essential for businesses to guarantee that their information aligns with the SDGs and supports the management of their social and environmental effects. Whereas, according to [Pizzi et al \(2024\)](#), sustainability reporting can enhance a company's legitimacy by fostering two-way dialogue with stakeholders, increasing transparency, and building long-lasting trust. In addition, according to [Maione \(2024\)](#); [Ta et al \(2024\)](#), sustainability reporting is becoming a vital tool for maintaining stakeholder confidence. The incorporation of Artificial Intelligence (AI) presents fresh possibilities to enhance the quality, punctuality, and significance of sustainability disclosures. On the other hand, according to [Lodhia et al \(2025\)](#); [Villiers et al \(2023\)](#), AI empowers businesses to examine large volumes of sustainability related information, streamline the reporting process, and generate insights that support more flexible and responsive engagement with stakeholders. Consequently, AI plays a crucial role in sustainability reporting, bolstering business legitimacy amid rising calls for accountability and transparency.

Recent studies illustrate how AI can be incorporated into sustainability reporting across several interconnected fields. As stated by [Alshdaifat et al \(2024\)](#), a comprehensive method that examines how various digital technologies, including blockchain, big data, Fintech, and artificial intelligence, work together to enhance sustainability practices in business. Using this technological foundation, many researchers have pinpointed applications: [Villiers et al \(2023\)](#) demonstrate how advanced language models like ChatGPT can improve the verification process for sustainability reports, while indicating that merging AI with blockchain technology creates robust systems for continuous auditing. These technological applications provide distinct advantages throughout the reporting lifecycle, as shown by [Adelakun et al \(2024\)](#) concerning process automation, framework customization, and compliance enhancement, and by [Khan et al \(2024\)](#), illustrating that insights produced by AI directly improve environmental outcomes and help achieve sustainability goals. These studies collectively demonstrate an evolving technological landscape where AI acts as both a catalyst for operational efficiencies and a contributor to notable sustainability outcomes.

Although there is a growing academic emphasis on combining AI with sustainability reporting, the study remains fragmented. As stated by [Adelakun et al \(2024\)](#); [Lodhia et al \(2025\)](#); [Villiers et al \(2023\)](#), a variety of research focusses on theoretical models, possible benefits, or specific instance of applications. Empirical evidence concerning the incorporation of AI into sustainability reporting practices across different sectors and regions remains limited. However, according to [Bakarich et al \(2020\)](#); [Bonsón & Bednárová \(2022\)](#); [Lodhia et al \(2025\)](#), the moral consequences of AI deployment, the trustworthiness of sustainability reports generated by AI, and the uniformity of AI implementations in verification procedures are key concerns that remain inadequately explored. Earlier studies have mainly concentrated on the theoretical capabilities of AI, specific case analysis, or conceptual models, but have not delivered a detailed overview of research trends and academic networks. This study addresses this gap by providing a comprehensive bibliometric analysis of the connection between AI and sustainability reporting.

In resolving these research gaps, this study offers numerous significant contributions to this developing field. Initially, it employs extensive bibliometric analysis to create a comprehensive map of the intellectual framework, principal contributors, collaborative networks, and thematic shifts. This allows for a clear view of how this field of knowledge has evolved. Additionally, it provides an

empirical understanding of research trends over different time frames, geographic locations, and academic disciplines, clearly pinpointing gaps and insufficiently explored areas that require focused examination. Third, the study enhances theoretical discourse by framing how AI technologies are fundamentally transforming sustainability reporting practices, including data collection and validation, stakeholder engagement, and assurance provision. To comprehensively explore current advancements in sustainability reporting studies with a particular emphasis on the incorporation of AI is the primary objective of this study. It aims to explore how bibliometric analysis can impact and guide future research in this field. To reach these goals, the study focuses on the subsequent three questions:

1. What are the primary trends in publications, journals, authors, nations, and organizations regarding the incorporation of AI in sustainability reporting?
2. Which documents, authors, and countries receive the highest number of citations in this domain?
3. How do primary patterns and networks reveal the main research themes and collaborations in the field?

Literature Review

AI in Sustainability Reporting

Transformed sustainability reporting by enhancing the process of data collection, analysis, and disclosure has been altered by Artificial Intelligence (AI). As stated by [Rane et al \(2024\)](#), AI technologies, such as machine learning and natural language processing, allow organizations to examine large volumes of environmental, social, and governance (ESG) data with improved accuracy and effectiveness. These technologies streamline tedious tasks and enhance predictive analytics, allowing organizations to anticipate sustainability risks and opportunities. As sustainability reports become more complex, AI-powered tools assist businesses in meeting stakeholder demands for transparency and responsibility.

Moreover, current studies have highlighted the role of AI in improving the reliability and comparability of sustainability reports. For instance, [Moodaley & Telukdarie \(2023\)](#) found that AI-powered text analysis tools can detect discrepancies and greenwashing in business reports, thus assisting regulators and investors with their decision-making. These tools improve standardized reporting methods across companies by allowing the verification of ESG claims against objective data sources. These methods address persistent challenges in sustainability reporting, including the subjectivity of qualitative information and the lack of standardized criteria [Moodaley & Telukdarie \(2023\)](#).

Even with these improvements, incorporating AI into sustainability reporting raises considerable ethical and governance challenges. However, [Kiel et al \(2017\)](#) contend that while AI can enhance the quality of reporting, it also introduces risks related to algorithmic bias, data privacy, and the transparency of decision-making. Thus, the technical execution with strong governance frameworks to ensure proper AI application should be balanced by the companies. It is in line with [Adelakun et al \(2024\)](#) stated that the literature highlights the importance of interdisciplinary research that combines AI, accounting, and sustainability to assist companies in utilizing AI for improved and trustworthy reporting.

Methods

This study employs a bibliometric method to comprehensively outline and examine the research landscape concerning the incorporation of AI in sustainability reporting. As stated by [Donthu et al \(2021\)](#), bibliometric analysis is a quantitative approach that allows the evaluation of publishing patterns, authorship, cooperative networks, key sources, and thematic advancements in a specific

domain. On the other hand, according to [Zupic & Čater \(2015\)](#), bibliometric analysis allows for a structured, unbiased, and trustworthy evaluation of research trends over time, the development of academic discourse, and shifts in the field of study, thus offering a comprehensive overview of the topic being analyzed. So, [Alshater et al \(2021\)](#) stated that the process was organized based on the steps illustrated in Figure 1, adhering to the method modified from.

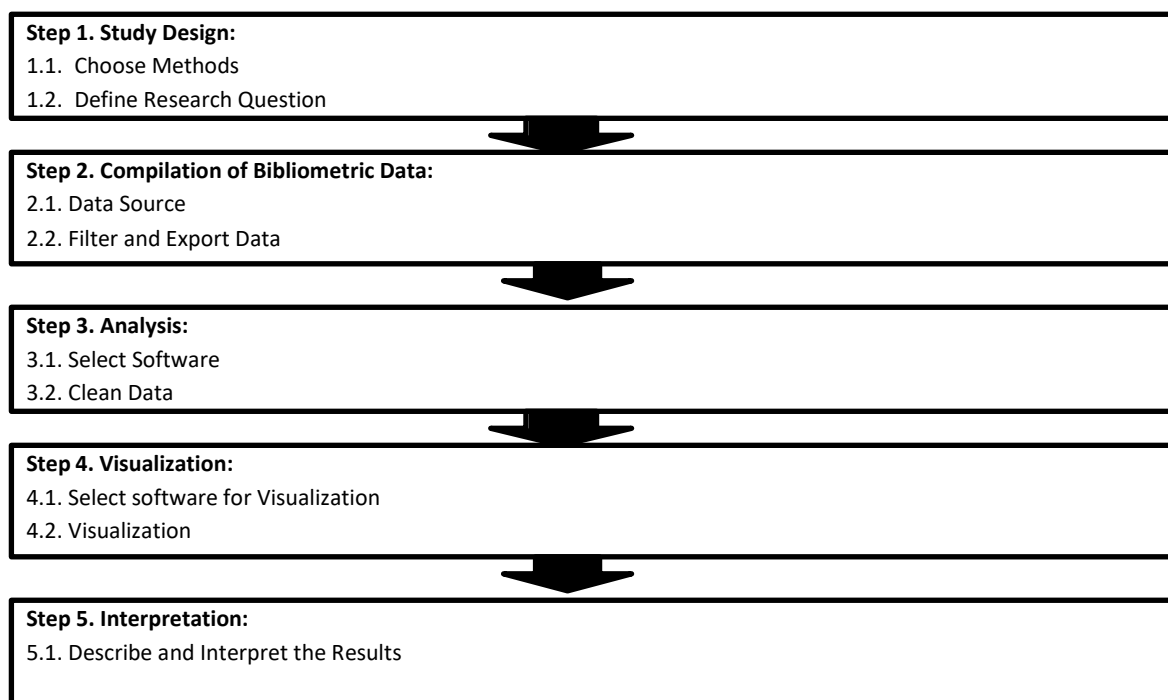


Figure 1. Flowchart of methodology

Data Collection Strategy

According to [Baas et al \(2020\)](#), this study systematically gathered information from the Scopus database, noted for its comprehensive inclusion of peer-reviewed works across various fields. While [Mohamed et al \(2025\)](#) stated that Scopus was selected for its extensive interdisciplinary reach, precise citation metrics, and enhanced export functions that enable comprehensive bibliometric analysis. To enhance the dataset and ensure its relevance to the research scope (TITLE-ABS-KEY), the subsequent search string was utilized in the Scopus database. Among the search terms utilized were AI* OR "Artificial Intelligence*" OR "data analytics*" OR "big data*" OR "deep learning*" AND Sustainability Reporting* OR "Sustainability" OR "Corporate Sustainability Reporting*" OR "Corporate-sustainability*" OR "Corporate Sustainability*" OR "Sustainability Report*" OR "Sustainability Reports*" OR "Sustainability Disclosures*" OR "Sustainability Disclosure*" OR "Sustainability Accounting*" OR "Corporate Social Responsibility Reporting*" OR "Corporate Social Responsibility Disclosure*" OR "CSR" OR "CSR Reporting*" OR "CSR Disclosure*" OR "Sustainability Performance*" OR "Corporate Social Reporting*" OR "Social And Environmental Accounting*" OR "integrated reporting*" OR "integrating report*" OR "GRI reporting*" OR "triple bottom line reporting*".

The data collection procedure took place on April 19, 2025, through the Scopus database, yielding an initial total of 14,389 documents. The dataset selection criteria focused exclusively on journal articles in English, which were narrowed down to the field of Business, Management, and Accounting to maintain relevance and quality. After data retrieval, a manual screening process involved examining titles, abstracts, and keywords to pinpoint and dismiss papers that were not pertinent to the study's topic, such as those associated with engineering, nursing, healthcare, and tourism. A thorough vetting procedure was implemented to eliminate duplicate and unnecessary

entries. A refined dataset comprising 3,690 documents released between 1981 and 2025 was acquired for bibliometric analysis.

Data Analysis Tools

This study utilized a blend of sophisticated bibliometric analysis to tackle the research questions. As explained by [Mishra & Kumar \(2024\)](#); [Yang & Thoo \(2023\)](#), VOSviewer was chosen for its strong visualization features, enabling the efficient mapping of scientific networks and thematic trends. It allows scholars to illustrate co-authorship networks, keyword co-occurrence, and citation patterns, rendering it an ideal tool for examining connections in bibliometric information. Based on Salim et al., (2025), this study employed Biblioshiny, a user-friendly web interface of the Bibliometric R application, noted for its ability to produce reliable and comprehensive bibliometric evaluations. Biblioshiny enables the performance of multiple bibliometric tasks, including citation analysis and the identification of a significant research domain.

Data Processing and Visualization

Scientific mapping, which focuses on defining the discipline's intellectual framework and documenting the development of research themes across time, is one step in the analytical process. This method made it easier to identify emerging trends and major themes in the literature on sustainability reporting and artificial intelligence. Network analysis was employed in addition to science mapping to show the relationship between authors, institutions, and keywords. Network analysis provides information about how different research bodies in the field collaborate and how strong their connections are.

Data Verification and Graph Generation

The accuracy and consistency of the study's findings were confirmed by data verification using Microsoft Excel. In addition to creating customizable graphs and charts that enhanced the visual representations produced by VOSviewer and Biblioshiny, this tool made it easier to verify data outputs. Additionally, Excel made it possible to organize and purify the data for additional research.

Results

General information

The annual scientific output concerning the incorporation of AI in sustainability reporting from 1981 to 2025 is shown in figure 2. The trend indicates a stagnant period in publication numbers from 1981 to around 2009, with fewer than 50 articles released each year. Starting in 2010, there is a clear and steady rise in research productivity, reflecting an increasing academic interest in this cross-disciplinary field. The increase becomes clearer after 2015, aligning with the worldwide acceptance of the Sustainable Development Goals (SDGs), indicating that sustainability pledges might have led to heightened research focus on the function of AI in enhancing sustainability disclosures and outcomes.

The number of publications reached its highest point in 2023, exceeding 700 articles, indicating a notable increase in scholarly interest in this subject. This swift growth could signify the progress of AI technologies like machine learning, natural language processing, and big data analytics, as well as the increasing need for clear and immediate sustainability information from stakeholders. Although there is a reduction in 2025, possibly due to the limited year coverage during data collection (April 19, 2025), the general trends indicate that the convergence of AI and sustainability reporting is evolving into a burgeoning and active research field. This upward trend underscores the importance of performing a bibliometric analysis to methodically chart, interpret, and assess the development and trends of this academic area.

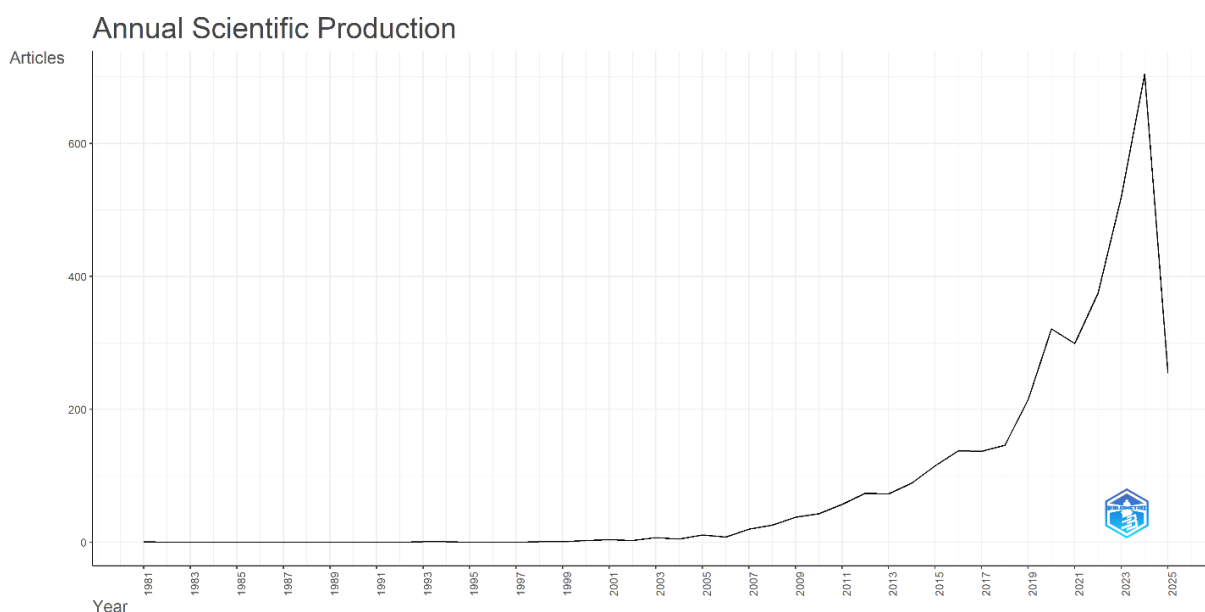


Figure 2. Distribution of integration of AI In Sustainability Reporting Literature over time

The Sustainability Accounting, Management and Policy Journal stands out with 215 documents, highlighting its significant position as a major publication source in this field, as indicated in Table 1. Next, the Social Responsibility Journal (197 documents) and Corporate Social Responsibility and Environmental Management (189 documents) highlight the ethical, environmental, and social aspects of corporate conduct. Additional significant journals encompass Meditari Accountancy Research (124 documents) and Cogent Business and Management (100 documents), emphasizing the topic’s interdisciplinary aspect. Moreover, the Journal of Business Ethics (76) and Accounting, Auditing and Accountability Journal (46), as recognized publications, illustrate the incorporation of ethical issues and accountability models in the conversation surrounding sustainability reporting and AI. This distribution highlights academic interest in both accounting-oriented and general business ethics journals.

Table 1. Most Relevant Journal

No	Journal Name	Documents
1	Sustainability Accounting, Management and Policy Journal	215
2	Social Responsibility Journal	197
3	Corporate Social Responsibility and Environmental Management	189
4	Meditari Accountancy Research	124
5	Cogent Business and Management	100
6	Journal Of Business Ethics	76
7	Journal Of Global Responsibility	61
8	Tqm Journal	51
9	Journal Of Business Research	47
10	Accounting, Auditing and Accountability Journal	46

The allocation of key sources according to Bradford's Law, which identifies the most prolific journals in the area of integrating AI into sustainability reporting, is shown in Figure 3. The primary zone, made up of journals that produce the largest volume of articles on the subject, is indicated by the shaded region. Among these, the Sustainability Accounting, Management and Policy Journal, Social Responsibility Journal, and Corporate Social Responsibility and Environmental Management emerge as the leading contributors. The classic Bradford distribution, which illustrates that a limited number

of journals generate the bulk of publications, while the rest of the articles are spread across many other journals with lesser individual outputs, is represented by the graph. The essential importance of these key journals in influencing and progressing research in this interdisciplinary field is highlighted in this part.

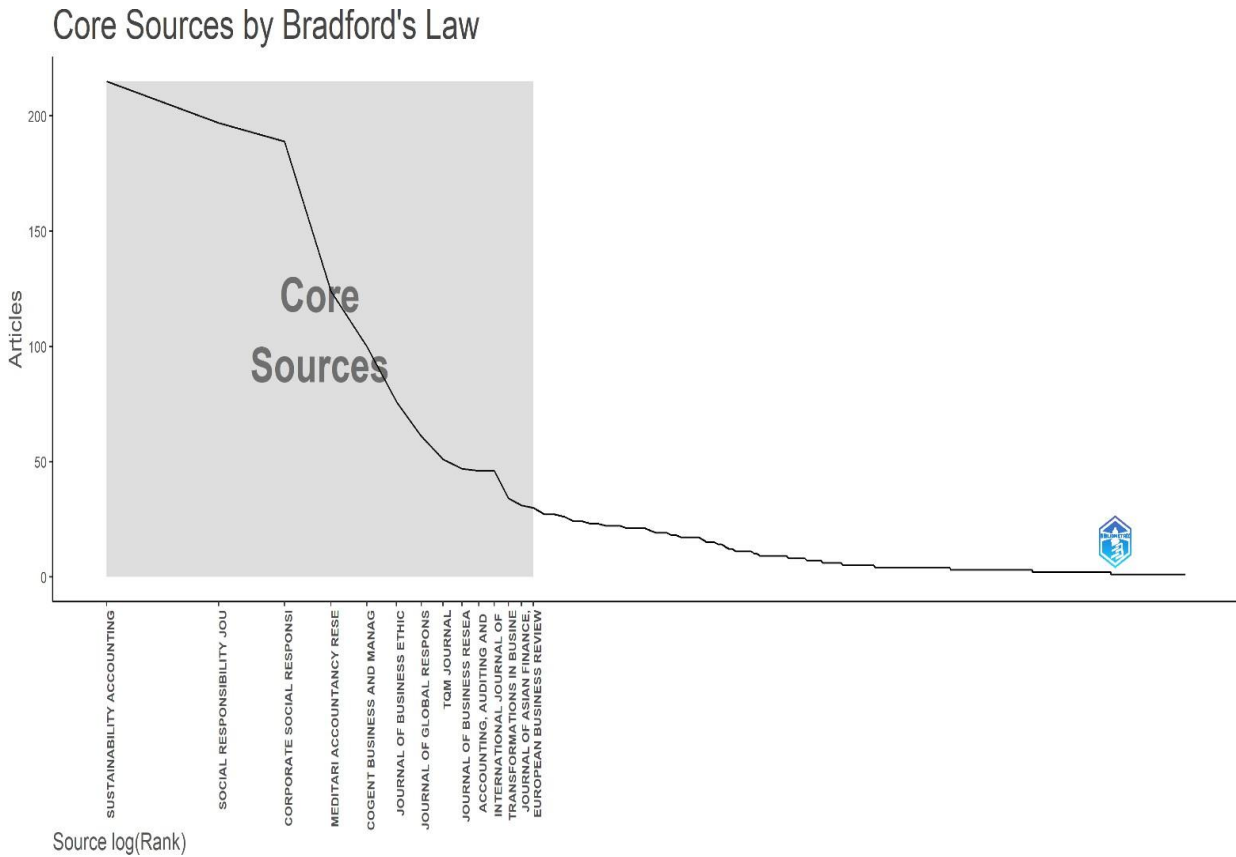


Figure 3. Influential Journals

The distribution of scientific publications by countries regarding the integration of AI in sustainability reporting is presented in Table 2. At the top list with 425 documents occupied by the United Kingdom, followed by the United States (355), Italy (337), and Australia (304), showcasing a strong research presence from Western countries. However, countries like India (277), Malaysia (244), and Indonesia (233) also demonstrate significant contributions, reflecting growing interest and engagement in sustainable development and digital transformation in these regions. At the same time, countries like Spain (236), China (159), and Germany (159) demonstrate steady academic engagement. The worldwide significance of the subject and showcases a variety of viewpoints and research efforts in both advanced and emerging countries is emphasized by this geographical distribution.

Table 2. Number of articles per country

No	Country	Document
1	United Kingdom	425
2	United States	355
3	Italy	337
4	Australia	304
5	India	277
6	Malaysia	244
7	Spain	236
8	Indonesia	233

9	China	159
10	Germany	159

The foremost institutions engaged in the literature about the incorporation of AI in sustainability reporting are displayed in Table 3. The UniSA Business, University of South Australia Business leads with 15 publications, followed by Lucian Blaga University of Sibiu in Romania with 13 publications, and the University of Turin in Italy with 11 publications. The significant research output, including Auckland University of Technology, Macquarie University, and Abu Dhabi University, is exhibited in numerous institutions from New Zealand, Italy, and the United Arab Emirates. Universitas Indonesia is prominently listed among the leading contributors with 7 documents, underscoring Southeast Asia's increasing significance in this domain. Italy leads the list with numerous universities in various cities, highlighting its robust academic emphasis on sustainability and digital innovation. This institutional diversity exemplifies global cooperation and interdisciplinary engagement, propelling research in AI and sustainability.

Table 3. Most relevant institutions (affiliations)

No	Organization	Document
1	Unisa Business, University of South Australia, Adelaide, Australia	15
2	Lucian Blaga University of Sibiu, Romania	13
3	Department of Management, University of Turin, Turin, Italy	11
4	Department of Accounting, Auckland University of Technology, Auckland, New Zealand	8
5	College of Business, Abu Dhabi University, Abu Dhabi, United Arab Emirates	7
6	Department of Accounting and Corporate Governance, Macquarie University, Sydney, Australia	7
7	Department of Accounting, Faculty of Economics and Business, Universitas Indonesia, Depok, Indonesia	7
8	Department of Economics and Management, University of Trento, Trento, Italy	1
9	Department of Accounting and Finance, The University of Auckland, Auckland, New Zealand	6
10	Department of Economics and Management, University of Florence, Florence, Italy	6
11	Department of Economics and Management, University of Pisa, Pisa, Italy	6
12	School of Accountancy, University of The Witwatersrand, Johannesburg, South Africa	6
13	Department of Accountancy and Finance, University of Otago, Dunedin, New Zealand	5
14	Department of Business Administration, University of Verona, Verona, Italy	5
15	Department of Economics and Management, University of Brescia, Brescia, Italy	5
16	Department of Economics and Management, University of Ferrara, Ferrara, Italy	5
17	Department of Industrial and Systems Engineering, Khalifa University, Abu Dhabi, United Arab Emirates	5

18	Department of Management, University of Turin, Torino, Italy	5
19	Durham University Business School, Durham University, Durham, United Kingdom	5
20	Institute Of Management, Scuola Superiore Sant'anna, Pisa, Italy	5

Citation Analysis

The important part of bibliometric research that evaluates the impact and influence of scientific publications by analyzing their citation frequency in other works is citation analysis. This approach facilitates the identification of the most impactful documents, authors, countries, and journals within a certain research field. To distinguish new research trends and assess the academic acknowledgement of specific contributions, the researchers identify seminal studies through citation patterns analysis. It not only indicates the visibility and significance of research outputs but also facilitates the mapping of intellectual frameworks and knowledge evolution within a discipline.

Most Cited Documents

Commonly cited documents in the domain of AI and sustainability reporting, emphasizing seminal works that have severely influenced academic discourse, are presented in Table 4. [Aguinis & Glavas \(2012\)](#), with 2,788 citations, proposing an extensive review and research plan on corporate social responsibility (CSR) becomes the most cited article. The impact of culture and governance on corporate social reporting by [Haniffa & Cooke \(2005\)](#), which underscores the significance of institutional and contextual elements in CSR practices, has been mentioned 1,272 times. Other works, such as [Reverte \(2009\)](#) and [Rao & Tilt \(2016\)](#), highlight the factors of CSR disclosure and the influence of board diversity, respectively, illustrating the transparency and inclusive governance accumulation in sustainable policies.

Numerous significant studies illustrate the increasing amalgamation of technology and sustainability, beyond traditional CSR. [Di Vaio et al \(2020\)](#) and [Nishant et al \(2020\)](#), examining the role of artificial intelligence in attaining sustainable development goals and addressing the potential and problems that AI poses for sustainability, are notable for over 600 citations each. Likewise, [Kiel et al., \(2017\)](#) and [Freudenreich et al., \(2020\)](#) examine Industry 4.0 and stakeholder theory on value creation for sustainability. This indicates that there are shifts in the literature towards interdisciplinary research that integrate technical innovation with sustainable business strategies.

Table 4. Most Cited Documents

No	Authors/year	Title	Source title	Cited
1	Aguinis & Glavas (2012)	What We Know and Don't Know About Corporate Social Responsibility: A Review and Research Agenda	Journal of Management	2788
2	Haniffa & Cooke (2005)	The impact of culture and governance on corporate social reporting	Journal of Accounting and Public Policy	1272
3	Reverte (2009)	Determinants of corporate social responsibility disclosure ratings by Spanish listed firms	Journal of Business Ethics	879
4	Rao & Tilt (2016)	Board Composition and Corporate Social Responsibility: The Role of Diversity, Gender, Strategy, and Decision Making	Journal of Business Ethics	694

5	Michelon et Al (2015)	CSR reporting practices and the quality of disclosure: An empirical analysis	Critical Perspectives on Accounting	657
6	Di Vaio et al (2020)	Artificial intelligence and business models in the Sustainable Development Goals perspective: A systematic literature review	Journal of Business Research	656
7	Saeed et al (2019)	Promoting employees' pro-environmental behavior through green human resource management practices	Corporate Social Responsibility and Environmental Management	620
8	Nishant et al (2020)	Artificial intelligence for sustainability: Challenges, opportunities, and a research agenda	International Journal of Information Management	614
9	Kiel et al (2017)	Sustainable industrial value creation: Benefits and challenges of Industry 4.0	International Journal of Innovation Management	571
10	Freudenreich et al (2020)	A Stakeholder Theory Perspective on Business Models: Value Creation for Sustainability	Journal of Business Ethics	571

Most Local Cited Authors

The most frequently cited authors in the domain of AI and sustainability reporting is presented in Table 5. The leading scholar, evidenced by 2,443 citations, indicating his significant influence on the evolution of sustainable accounting and performance management literature, is Stefan Schaltegger. Following him with their substantial scholarly contributions to sustainability transparency, accountability, and corporate social responsibility is occupied by Jan Bebbington (1,172 citations), Giovanna Michelon (1,073 citations), and Carol Tilt (1,040 citations). Other prominent authors who have advanced discussions on sustainability assurance, stakeholder engagement, and integrated reporting are Charl De Villiers, Isabel-María García-Sánchez, and Giacomo Manetti, with over 800 citations for each. Their academic interest in sustainability topics and the pivotal role these researchers occupy in influencing the discipline are growing through the consistency of citation numbers.

Table 5. Most Cited Authors

No	Author	Citations
1	Schaltegger, Stefan	2443
2	Bebbington, Jan	1172
3	Michelon, Giovanna	1073
4	Tilt, Carol	1040
5	De Villiers, Charl	944
6	García-Sánchez, Isabel-María	923
7	Manetti, Giacomo	825
8	Martínez-Ferrero, Jennifer	740
9	Larrinaga, Carlos	705
10	Hussainey, Khaled	651

Most Cited Countries

The significant insight into the geographic distribution and collaboration trends within the study field can be clearly seen in Figure 4, which shows the most cited countries. The data point out that the United Kingdom, the United States, Malaysia, India, and Saudi Arabia function as crucial centers of academic activity. The significantly elevated citation counts, and robust international collaboration indicate that these countries have strong nodes and networks. These findings indicate that these countries considerably contribute to the advancement of the subject and play a crucial role in influencing global research discourse through extensive co-authorship and citation connections.

In contrast, other nations such as Ecuador, Japan, and Uganda seem to have a more peripheral position within the network. Their restricted connections and reduced node sizes indicate diminished visibility and integration within the global research community. The emergence of various clusters, as represented by color groups, underscores geographical or thematic research collaborations. This indicates that although the topic is internationally interconnected, it is nevertheless shaped by regional research ecosystems. These findings highlight the necessity of promoting more inclusive and varied international collaborations to guarantee wider knowledge exchange and representation in the field.

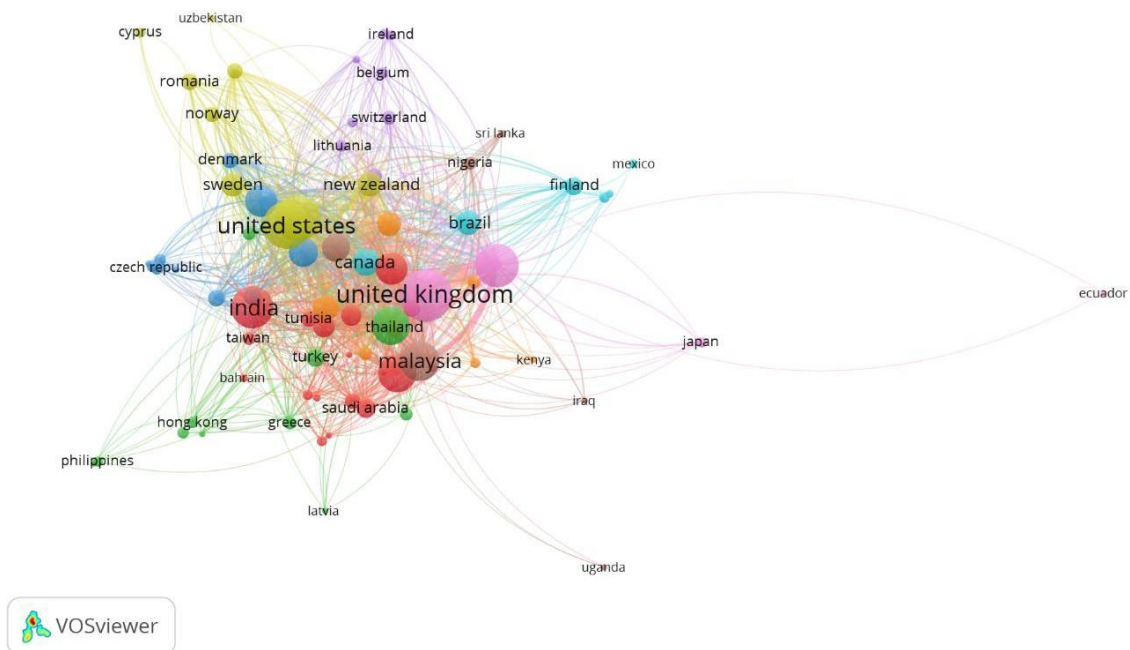


Figure 4. Most Cited Countries

Network Analysis

Co-Citation Analysis

A co-citation network of journals in sustainability reporting research, delineating five distinct clusters categorized by color, is illustrated in Figure 5. The network is characterized by prominent publications such as the Journal of Business Ethics, Journal of Cleaner Production, and Academy of Management Review, with each cluster denoting distinct research areas: operational sustainability (red), social responsibility (green), management theory (blue), accounting frameworks (yellow), and strategic economics (light blue). This grouping illustrates the profoundly interdisciplinary character of sustainability reporting research, establishing the intellectual basis for the development of AI applications in this domain.

The essential insights from this concept about AI in sustainability reporting research, by emphasizing the existing knowledge base and identifying future research gaps, can be seen clearly. Although it encompasses various disciplines, including corporate ethics, production processes, management strategies, and accounting frameworks, the scarcity of technology-oriented publications indicates that they are inadequately represented in the existing literature. This discovery highlights

rooted in stakeholder theory and the ethical dimensions of sustainability. The Environmental Dimensions cluster (red) highlights environmental concerns through keywords such as “climate change,” “efficiency,” “environmental performance,” and “EMAS.” Meanwhile, the Methodological Approaches cluster (pink/orange) includes terms such as “content analysis,” “design/methodology/approach,” and “reporting,” signaling a focus on research design and analytical techniques. Lastly, the Strategic Business Value cluster (blue) brings attention to the business advantages of sustainability reporting, with keywords like “competitive advantage,” “branding,” “learning technology,” and “tourism sector.”

A key finding from this visualization is the limited presence of artificial intelligence (AI)-related keywords. Terms such as “machine learning,” “natural language processing,” “artificial intelligence,” and “big data analytics” are notably absent. While the word “technology” does appear, it is peripheral and not specifically associated with AI applications. Even the keyword “blockchain,” which represents a more recent technological intervention in sustainability reporting, appears only marginally within the network.

This absence of AI-related keywords is a significant finding that supports the novelty and contribution of this study. It clearly indicates that, despite the transformative potential of AI in enhancing sustainability reporting, the integration of such technologies has not yet become a core part of the research identity in this field. This point can be emphasized in the Discussion section as evidence that AI adoption in sustainability reporting remains in its early stages. The current literature landscape appears predominantly conceptual, with limited empirical research demonstrating real-world implementation of AI-driven sustainability reporting practices. In this context, this research gap offers an explicit examination and mapping roles of AI as a valuable opportunity for original contribution. It can be seen from the visualization that while sustainability reporting research has evolved along multiple dimensions, including regulatory frameworks, stakeholder engagement, environmental performance, methodological approaches, and strategic business benefits, the technological dimension, particularly with regard to advanced AI applications, remains underexplored. This reinforces the relevance and validity of our research focus and highlights its potential to establish a new scholarly direction by systematically exploring the emerging intersection of AI and sustainability reporting. This study provides valuable insights for researchers, practitioners, and policymakers aiming to better understand and accelerate the use of AI technologies to improve sustainability reporting practices by drawing attention to the early phase of AI integration in this domain.

Discussion

This study highlighted a growing scholarly interest in the intersection between Artificial Intelligence (AI) and sustainability reporting, particularly following the global endorsement of the Sustainable Development Goals (SDGs) in 2015. A dynamic expansion of this interdisciplinary field, where AI is increasingly perceived as a valuable tool to enhance the accuracy, efficiency, and transparency of sustainability disclosures, can be seen from the sharp increase in publication volume. However, despite the significant increase in academic output, bibliometric analysis reveals that most contributions are primarily theoretical or conceptual. Limited empirical research has been undertaken to record actual AI implementations in corporate reporting processes. For instance, while researchers like [Di Vaio et al \(2020\)](#) and [Nishant et al \(2020\)](#) have examined the theoretical implications of AI in facilitating sustainable development and sustainability reporting, their contributions predominantly focus on conceptual frameworks and prospective research directions rather than practical application. Even in the presence of case-based research, such as [Lodhia et al \(2025\)](#), the scope is typically constrained, frequently concentrating on particular sectors or developed regions, which restricts wider generalizability.

Besides the conceptual focus of current studies, our study uncovers notable regional and institutional inequalities in the allocation of research contributions. The countries such as the United Kingdom, the United States, and Italy are preeminent in publication volume and citations, signifying

their influence in the area. Simultaneously, emerging economies such as Indonesia and Malaysia have demonstrated an increasing presence; yet, their impact on international research partnership networks remains limited. The global significance of AI in sustainability reporting, while also indicating an uneven developmental trajectory, is highlighted in these findings. This gap needs enhanced South–North cooperation and more inclusive academic partnerships to foster varied views, localized insights, and contextually relevant applications of AI in sustainable practices.

The most striking observations from this study lie in the noticeable absence of AI-related keywords such as “machine learning,” “natural language processing,” and “big data analytics”—within the central co-occurrence network of sustainability reporting literature. These terms are either marginal or completely absent from the dominant thematic clusters, although the a growing discourse on the transformative potential of AI. This indicates that AI, while increasingly acknowledged, has yet to become a foundational concept in the academic identity of sustainability reporting. The limited presence of such keywords suggests a disconnect between the availability of advanced technological tools and the current scholarly focus. From a theoretical outlook, this also implies that existing models—such as stakeholder theory or legitimacy theory—have yet to integrate the notion of technological legitimacy into their explanatory frameworks. While the absence of empirically grounded models may hinder organizations and regulators from adopting AI effectively in sustainability disclosures, as best practices, implementation challenges, and governance risks remain underexplored can be seen from a practical perspective. This study identifies several promising directions for future research to address these limitations.

To address this gap, the study introduces refined thematic clusters that capture how AI is beginning to influence sustainability reporting. These clusters highlight emerging research areas and key contributors, offering clearer direction for future inquiry. The thematic classification can be seen in Table 6 below.

Table 6. Thematic Clusters of AI in Sustainability Reporting

Research Theme	Future Research Question/Agenda	Key Authors
AI for ESG Data Processing and Automation	How can AI enhance the efficiency and accuracy of ESG data collection and reporting across industries?	Rane et al (2024) ; Adelakun et al. (2024) ; Lodhia et al (2025) ; Khan et al (2024)
AI in Assurance and Greenwashing Detection	How can AI tools be used to verify sustainability disclosures and detect greenwashing practices effectively?	Moodaley & Telukdarie (2023) ; Villiers et al (2023) ; Bakarich et al (2020) ; Bonsón & Bednárová (2022)
Conceptual and Strategic Integration of AI in SR	What frameworks are needed to embed AI into strategic sustainability reporting models?	Di Vaio et al (2020) ; Nishant et al (2020) ; Maione (2024) ; Ta et al (2024)
Ethical, Governance, and Standardization Challenges	What ethical standards and governance mechanisms should guide AI-based sustainability reporting?	Kiel et al (2017) ; Lodhia et al (2025) ; Bakarich et al (2020)
AI-Driven Stakeholder Engagement and Impact Measurement	How can AI facilitate real-time stakeholder engagement and measure social/environmental impact effectively?	Freudenreich et al (2020) ; Saeed et al (2019) ; Adelakun et al (2024)

The empirical investigations into how AI tools are being operationalized in different stages of the sustainability reporting process, from data collection and verification to real-time stakeholder engagement and assurance, should be prioritized by the researchers. Moreover, they are needed to develop standardized frameworks for AI-enabled reporting practices that ensure consistency, comparability, and accountability. Besides, ethical considerations such as data privacy, algorithmic bias, transparency of AI decision-making, and the risk of technological determinism also warrant deeper exploration. Future studies can bridge the gap between conceptual propositions and practical implementation by solving these issues, thereby contributing to a more robust, evidence-based understanding of how AI can advance the quality and impact of sustainability reporting to meet the evolving expectations of stakeholders, regulators, and society at large.

Conclusion

The emerging research landscape concerning the integration of AI in sustainability reporting, revealing several significant insights, has been systematically mapped through this bibliometric analysis. The exponential growth in publication volume since 2010, particularly after 2015, demonstrates increasing scholarly interest in how AI technologies can enhance sustainability disclosure practices, coinciding with the global adoption of Sustainable Development Goals. Then, the analysis identified key research clusters and influential contributors that have shaped the intellectual foundation of the field, with leading journals such as *Sustainability Accounting, Management and Policy Journal*, and prominent scholars from institutions across multiple continents playing a central role in driving knowledge development becomes the second part.

However, perhaps the most notable finding is the significant research gap identified through keyword co-occurrence analysis, despite the transformative potential of AI in sustainability reporting; technological applications remain peripheral in the current literature. While sustainability reporting research has evolved along multiple dimensions, including regulatory frameworks, stakeholder engagement, environmental performance, methodological approaches, and strategic business benefits, AI-related keywords such as "machine learning," "natural language processing," and "big data analytics" are conspicuously absent from the central discourse.

This gap highlights a significant opportunity for future research to empirically examine the implementation of AI technology in sustainability reporting practices across various sectors and countries. The way AI can enhance data gathering and verification methods, improve the quality and reliability of sustainability disclosures, enable real-time stakeholder engagement, and strengthen assurance systems. Furthermore, critical questions regarding the ethical implications of AI-facilitated sustainability reporting, the standardization of AI applications in assurance processes, and their effects on corporate transparency and accountability necessitate additional examination should be investigated by the researchers.

As sustainability reporting increasingly emerges as a strategic necessity for global enterprises, the incorporation of AI presents promising avenues for enhanced efficiency, accuracy, and significance in disclosures. This study establishes a basis for enhancing theoretical comprehension and practical applications in this swiftly developing topic by delineating the existing knowledge and pinpointing research deficiencies.

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